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*Dredging of The Windermere
Basin and The Disposal
of Contaminated Sediment
May 20, 1986.*

referred to in item
70(a) of the Twelfth
Report of the
Transport and
Environment Committee

THE DREDGING OF THE WINDERMERE BASIN
AND THE DISPOSAL OF CONTAMINATED SEDIMENT

May 20, 1986

Prepared by:

WINDERMERE BASIN TECHNICAL ADVISORY COMMITTEE

May 23, 1986

TO: Regional Municipality of Hamilton-Wentworth
City of Hamilton
Hamilton Harbour Commissioners
Ontario Ministry of the Environment
Environment Canada
Hamilton Region Conservation Authority

RE: The Dredging of the Windermere Basin and the
Disposal of Contaminated Sediments

Dear Sirs:

I am pleased to submit herewith the conclusions reached by the Windermere Basin Technical Advisory Committee on the above noted project. Copies of the two relevant technical reports are also enclosed. This report provides an outline of the problem, and a preferred solution. A list of items yet to be addressed is also included. Most of these items will be dealt with during the final design stage of the project.

During the course of the work, valuable assistance and guidance was provided by your representative on the committee which was much appreciated and is hereby acknowledged.

Should you wish to discuss the report in greater detail, please do not hesitate to call on your representative.

Yours truly,

B.W. Vanderbrug,
Chairman,
Windermere Basin Technical Advisory Committee

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BACKGROUND

On June 2, 1983, the Hamilton Region Conservation Authority adopted the following resolution:

THAT a joint committee be struck composed of the Hamilton Harbour Commissioners, the Ministry of the Environment, the Regional Municipality of Hamilton-Wentworth, the City of Hamilton and the Hamilton Region Conservation Authority, and further

THAT the committee be a staff committee, and further

THAT the committee be charged with examining the entire question of the Redhill Creek and Windermere Basin area in order to determine firm recommendations which will lead to the solution of the Windermere Basin problem.

The above recommendation was accepted by the affected public agencies and the first meeting of the newly formed committee was held on March 2, 1984. The committee consists of the following representatives

K. Brenner	Regional Municipality of Hamilton-Wentworth
S. Spencer	Regional Municipality of Hamilton-Wentworth
V. Forde	City of Hamilton
B. Hennessy	Hamilton Harbour Commissioners
S. Irwin	Ministry of the Environment
J. Mayes	Ministry of the Environment
R. Stewart	Ministry of the Environment
I. Orchard	Environment Canada
B. Vanderbrug	Hamilton Region Conservation Authority (appointed as Chairman)

The committee met on 12 occasions and commissioned two technical studies. This report summarizes the conclusions reached by the committee and also provides background information on the basin. Copies of the two technical reports and an earlier study can be obtained from the Hamilton office of the Ontario Ministry of the Environment (Windermere Basin Study prepared by the Ontario Ministry of the Environment dated December, 1982; Windermere Basin Sediment Study prepared by Envirosearch Ltd., dated April, 1985; Evaluation of the Leachability of Dredged Windermere Basin Sediment prepared by the Waste Water Technology Centre (Environment Canada) dated May, 1986). Another report considered during the evaluation process was a feasibility study for improvements to the Windermere Basin undertaken for the Hamilton Harbour Commissioners by Mar-Land Engineering Ltd.

THE PROBLEM

The Windermere Basin is a relatively small 40 hectare (+ 100 acre) basin situated at the south east corner of Hamilton Harbour (see attached Appendix 1). The drainage area surrounding the basin is urbanized and industrialized. The basin receives surface runoff from Redhill Creek and the treated effluent from the Hamilton sewage treatment plant. Over time, pollutants were discharged to the basin which settled to its bottom, causing a build up of contaminated sediments. The contaminated sediments range from a few centimeters to 5 meters in thickness, but in most places occupy primarily the upper 70 centimeters. Concentration of the contaminants is the highest in the upper layers.

The major environmental concern associated with the presence of the contaminated sediments is the possibility of the sediments being scoured from the basin and carried to Hamilton Harbour or Lake Ontario. The probability of scouring during a major storm event is quite high.

There is also a serious concern about the aesthetics of the basin. Due to fluctuation in the water level of Lake Ontario and Hamilton Harbour, large deposits of sediment are regularly exposed. These exposed sediments and entrained debris detract from the aesthetics of the area. The basin is the first impression of Hamilton to the millions of Q.E.W. travellers. There is therefore an increasing interest in cleaning up the basin for aesthetic reasons.

SUGGESTED SOLUTIONS

Available studies suggest a number of alternatives for the removal of the contaminated sediment and its disposal. They include the following:

- . Do nothing
- . Complete dredging
- . Partial dredging
- . Raise water level with dam
- . Create marsh on mud flats
- . Create tertiary treatment marsh
- . Channelize and fill

The environmental risks, aesthetic considerations, costs, legal questions and social political issues were considered by committee members for each alternative. In addition, various alternatives for sediment disposal were considered.

1. On site disposal within a containment area within a portion of the Windermere Basin. (Estimated 1986 cost for dredging and disposal - \$4,400,000 to \$7,700,000)
2. Dewatering of sediments and the transporting of the dewatered material to a landfill site. (Estimated 1986 cost for dredging and disposal - \$29,700,000 to \$38,500,000)
3. Dewatering and incineration of the sediments at the Woodward Avenue sewage treatment plant. (Estimated 1986 cost for dredging and disposal - \$20,900,000)

PREFERRED SOLUTION

After much study and debate, the committee reached consensus that a partial dredging and fill solution would be the preferred solution from an environmental and financial point of view. The question which remained to be studied and resolved was whether or not the dredged sediments should be chemically stabilized to reduce the danger of contaminants leaching back into the basin.

Although the chemical stabilization (fixation) of dredgeate is not a proven science, enough research data is available to conclude that fixation will make it more difficult for toxic substances to escape into the environment. There are, however, a number of problems with the fixation technique, not the least one being its cost. (Estimated cost of dredging and regular disposal - \$4,400,000; dredging and disposal with stabilization of dredgeate - \$7,700,000). In addition, there is the problem of increased volume. The fixation process involves the addition of considerable quantities of fly ash lime (or other suitable additives) to the dredgeate which would more than double its final volume. This added volume would obviously aggravate the disposal problem.

The Envirosearch study results indicated that stabilization may be required while subsequent analyses suggested that the contaminants would not leach out of the disposal site. Further investigations revealed that the Envirosearch conclusions were based on incorrectly reported data made available to them. Nonetheless, the committee felt that more research was needed and the Waste Water Technology Centre of Environment Canada was contacted to undertake this work. The main purpose of the study was to simulate the placement of contaminated dredged sediments behind berms and to determine if natural environmental processes would cause the contaminants to leach into the basin. Affirmative results would dictate fixation while low levels of pollutants in the leachate would allow a more traditional disposal approach.

The study was completed in early May, 1986 and test results indicated that leachates from the disposal area would be relatively low in contaminants. With this information, the committee was able to conclude that fixation would not be necessary.

In view of the above, the following is recommended:

1. That the basin be partially dredged
2. That the sediments be disposed of on site behind containment berms
3. That the sediments be disposed of without chemical stabilization.

OTHER CONSIDERATIONS

The main mandate of the committee was to reach consensus on the most appropriate method of sediment removal and the safe disposition of the contaminated sediment. That mandate has been met. Nonetheless, the committee did discuss related issues which are to be considered before implementation can take place. The following lists the various issues and summarizes opinions and conclusions reached by the committee.

How much sediment should be removed?

To make the project effective, it is important that seriously contaminated sediments be removed from contact with open water. Generally, this will involve the top 70 centimeters, although the actual depth will vary from location to location. Taking the above criterion in mind, it is estimated that a minimum of 280,000 cubic meters of sediment is to be removed from open water contact. There will be no requirement to remove contaminated sediment from the designated disposal areas.

Which area of the basin should be set aside as a sediment disposal area?

Several locations with different configurations are feasible. A final selection will, to a large extent, depend on design considerations, the ultimate use to be made of the containment area, and the ownership of the basin. An ownership map is attached to this report as Appendix 2.

How much water volume and water surface area should be maintained?

It is important to maintain as large a water volume and water surface area as possible. Volume is required to make the basin functional as a sediment settling area. A substantial water surface area is important as it increases the basin's capacity to absorb oxygen from the atmosphere. Considering the quantity of fill to be disposed of it should be possible to maintain at least 50% of the basin's surface area.

What precautionary measures should be taken during the sediment removal process?

Measures must be taken during the dredging process to minimize the transportation of contaminated sediment from the basin to the harbour and possibly Lake Ontario. The area to be dredged must therefore be isolated during the dredging operation. There are a range of possibilities, e.g.

- . A system of weirs
- . Bubble curtains
- . Silt curtains
- . Bypass channels.

The final design is to determine the best system to use.

What should be the ultimate land use of the dredgeate disposal area once the dredging is completed?

This question is considered to be beyond the mandate of the committee and was therefore not dealt with. Decisions on land use matters must be made through normal Regional and City planning procedures.

How can the project be of benefit to improve the aesthetics of the basin?

The dredging of the basin offers an excellent opportunity to improve the aesthetics of the area. The degree of this improvement will, to a large extent, depend on the location and configuration of the disposal areas as well as their ultimate use. Although members expressed certain points of view on this question, it was considered to be beyond the committee's mandate to make recommendations and/or suggestions.

Which agency should be the project proponent?

The Hamilton Harbour Commissioners have offered to be the project proponent. Both Regional and City Councils have accepted this offer. It is the opinion of the committee that the Hamilton Harbour Commissioners would be a suitable proponent, subject to all requirements respecting environmental and land use issues being met wherever they apply.

Will it be necessary to undertake an environmental assessment before the project is started?

Since the Hamilton Harbour Commissioners will be the likely project proponents, it is expected that a Federal environmental project appraisal will be required. The work done by the Windermere Basin Technical Committee and the technical reports produced will greatly assist in streamlining the process.

What preventative measures should be undertaken to prevent a similar situation from recurring?

It is essential that a long term commitment on maintenance and preventative measures be made. Preventative measures would include the following:

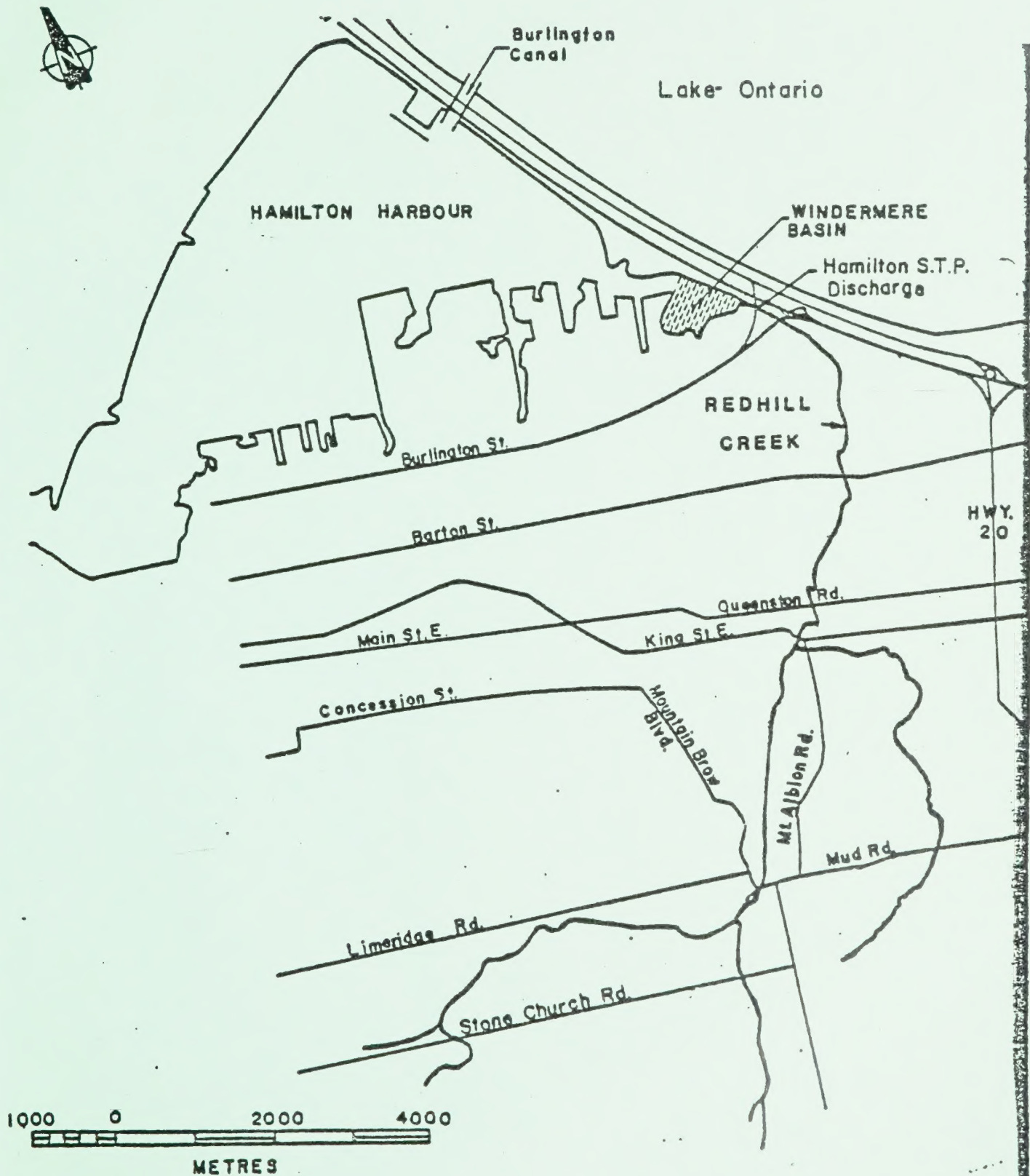
- . An urban stormwater management program for Redhill Creek (Cities of Hamilton and Stoney Creek, Township of Glanbrook)
- . The control of combined sewer overflows)
- . Upstream erosion control measures (Conservation Authority, Region, City, landowners)
- . The setting of high water quality standards for all effluent discharging into the basin (MOE)

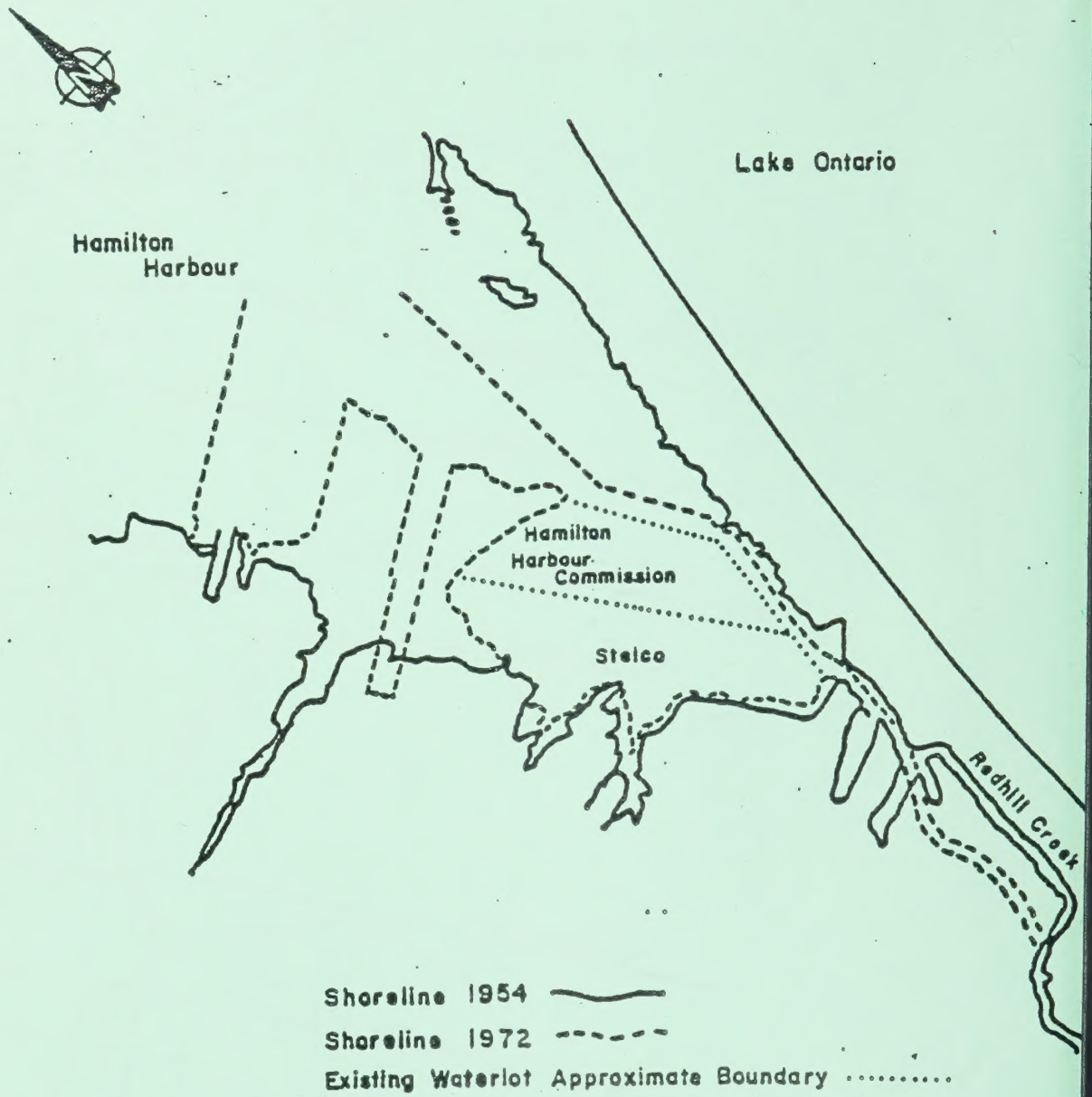
In spite of these long range preventative measures, it is expected that some sediments will continue to settle in the basin. The final design of the basin should be such to allow for the trapping of the sediments in special settling areas. These settling areas will require periodic dredging.

CONCLUSION

There is agreement that the rehabilitation of the Windermere Basin is one of the highest environmental and aesthetics issues in the Region. After much research and debate, there now appears to be a viable solution. It is the hope of all committee members that outstanding issues will soon be resolved so that the clean up of the basin will soon be a reality.

Committee members are prepared to continue as a committee during the implementation phase of the project, if so requested by the project proponent.





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